INDUSTRIAL ARTS

IN OUR

ELEMENTARY SCHOOLS

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PREFACE

IT IS only natural that all true Americans should be proud of our democratic claim that free education is provided in each public rural and urban school in the United States. However, our faith in this boast cannot carry much conviction, either with ourselves or with others, unless the elementary schools are seriously concerned with those human activities that contribute most in preparing for the many-sided demands which confront all intelligent consumers and worthy citizens. If our elementary industrial arts courses are to continue to occupy an important place in the program for elementary education, they must soon be subjected to the same general tests and judged by the same high standards that apply to the other elementary school subjects. The relative possibilities in the different plans for realizing common objectives also must be determined more scientifically than heretofore.

These brief reports dealing with the various units of elementary industrial arts work and study, which were successfully organized and conducted by Miss Hunter and the several other teachers named in connection with their respective contributions, were collected for the 1921 Yearbook by the Industrial Arts Committee* of the National Society for the study of Education. Since it did not prove expedient for the Society to publish Part III of its 1921 Yearbook, which was to have included these suggestive reports, it has been recommended and urged that this carefully planned and tried material on promising experiments for developing industrial courses and projects to meet the psychological and social needs of elementary school pupils should be revised for publication as a handbook for teachers of industrial arts in elementary schools. In order that all concerned might derive the most help from these valuable units and projects, it finally has been decided to present them in connection with the findings and implications resulting from this investigation of 141 public school systems.

The educational needs of today seem to call for instruction which aims (1) to develop the pupil's general and special capacities and (2) to prepare him for the demands which the future is going to make upon him. But it is obvious that the early conception of the rudiments of elementary education, involving some skill in reading, writing, and arithmetic, altho still important, will not begin to suffice either in aiding pupils who continue their school work to choose their courses more wisely in secondary education, or in helping those who might find it advisable or necessary to leave school with a minimum amount of education to choose their respective procedure more thotfully. While it has long since been agreed that, if possible, children should be sufficiently well prepared in school so that they may exercise intelligent judgment in weighing values and in choosing their future courses of study and work, the traditional curriculum has quite frequently failed to furnish those concrete experiences and reliable facts pertaining to the social, the economic, and the larger personal aspects of our most important life occupations, all of which could help to make this possibility a reality.

After reading these suggestive reports dealing with the purpose, content and method of various correlated units and

*This committee was composed of L. A. Herr, G. H. Hargitt and A. H. Edgerton, chairman.

projects, all must agree that the teachers concerned are seriously attempting to adapt both the construction work and the subject-matter to *those situations and responses which promise most in determining social conduct, thru the development of proper habits, attitudes, and appreciations.*

Readers desiring a more complete study of the development of those fundamental principles for selection, and the adaptation of such principles to elementary school curricula, are referred to the numerous standard works, of which Professor F. G. Bonser's "Elementary School Curriculum" is perhaps the most directly practical. For aid generously given, I wish to thank the many teachers, supervisors, principals, and superintendents who co-operated both in collecting and in checking these data used as a basis for the comparative studies included thruout this publication. The writer wishes to express his indebtedness to the several experienced teachers who have cheerfully contributed the numerous brief reports acknowledged in the following pages, and, in particular, this gratitude to Miss Rosana Hunter of the City Public Schools in Indianapolis, Indiana, and to Mr. L. A. Herr of The Lincoln School, New York City, for valued assistance rendered in the preparation of manuscript for the original report.

—A. H. E.

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INDUSTRIAL ARTS IN OUR ELEMENTARY SCHOOLS

I. Emphasis in Purpose and Content

General Purpose of Industrial Experiences in 141 Systems

OUR most progressive public school systems now recognize the important need for properly presenting, organizing, and offering industrial arts activities in the first six grades of school experience. This notable tendency of the past few years undoubtedly is due in part to the marked change in the purpose, content, and method of the industrial work now given as a means of developing general intelligence and knowledge of the industries during the elementary-school period in much of the best public school curricula. At least, this is the verdict of a large majority (117) of the 141 progressive school systems which have reported recently from 19 different states on the industrial activities now being experienced by their elementary school pupils.

While the emphasis in the work and study in these elementary grades (one to six, inclusive) differs somewhat in keeping with the various types of schools investigated, Table I and Fig. I make it evident that *those courses which are designed for studying present-day industries in an elementary way, in order that boys and girls may be more intelligent and appreciative of the conditions, materials, processes, and methods involved in manufacturing the products observed in everyday life, are rapidly replacing the so-called "busy work" or handwork courses*, many of which have had the doing and making of things as their primary aim or purpose.

This investigation and a number of recent school surveys make it evident that the larger values in elementary industrial arts cannot be realized alone by merely making even useful and serviceable products. If these activities are to continue to occupy an important place in the elementary school program, it is believed by many that they will be expected to share the responsibility with other subjects for *helping pupils to develop appreciative insight and reasoning ability in terms of significant interests and actual life needs.* Both psychology and experience have taught us that children from six to twelve years of age are mainly concerned with the activities and situations in which adults are engaged, rather than in series of exercises, models, or pieces of an abstract nature. Then, too, it is a generally accepted fact today that extended repitition of the same operations and processes causes children of this age to lose interest in their work and also to gain a larger amount of technic in the use of hand tools than is commensurate with the relative value of the time and energy expended. Altho the importance of skill or dexterity is fully recognized as a factor in general elementary education, results of several experiments and observations, which will be given later in these chapters, clearly indicate that either one of these will prove of most value when vitalized thru those concrete experiences that stimulate thinking and actually relate to the needs of everyday life.

Chief Claims Reported for Offering Elementary Industrial Arts

In the reports from these 141 school systems, each of which gave its main reason for offering industrial work in the elementary school, the four leading claims, when collated, were found to be given the order of importance shown in Table I, which follows:

TABLE I. Listing the Chief Reason for Offering Industrial Arts Instruction in the First Six Grades of Each of 141 Public School Systems.

ITEM	NUMBER
1. Giving a basis for judgment in the selection and use of industrial products and service	51
2. Developing an appreciation for the economic and social phases of industry	39
3. Gaining sufficient experience in industrial processes to meet the pupil's needs and to illustrate the industry	32
4. Vitalizing geography, history, arithmetic, oral and written expression, and other subjects in the curriculum	19
Total Number Reported	141

Altho it was discovered that in a few cases these claims were expressions of future plans rather than the present status and conduct of the work, nevertheless, only about six per cent of these public school systems have made practically no changes in the methods of organizing and conducting their elementary industrial work during the past few years. On the other hand, *over eighty per cent of these school systems show every evidence of having undergone desirable reorganization in methods and procedure.*

CHANGING TENDENCIES IN METHODS FOR ORGANIZING AND CONDUCTING ACTIVITIES

Industrial arts as an elementary school subject has been well defined as "the distilled experience of man in his resolution of natural materials to his needs for creature comfort, to the end that he may more richly live his spiritual life."[1] This resolution of natural materials to man's needs involves the study of our great industrial life. With advancing civilization a highly specialized industrial system has been developed. The finished products by which the needs of man are supplied are the results of complicated manufacturing processes. By means of these processes the raw materials of industry are transformed into the many finished products of varying quality and value required by man. The school work is necessarily so graded that the simple phases of industrial experience and study may be developed in the lower grades (one, two and three) and the more complex phases taken up in the higher grades (four, five, and six).

The composite of the individual reports in this investigation, as tabulated in Table I, shows that the purpose of the elementary industrial arts in an increasing number of these schools is to provide a background of experience and knowledge, using various types of materials that will enable the pupils to appreciate and understand those industrial processes that supply fundamental needs. The subject-matter is, therefore, in the main, found in a consideration of how man's food, clothing, shelter, utensils, tools, machines, and other utilities are provided. Fig. I gives the total number and per cent of the 141 school systems offering instruction in each type of industrial experience reported. The materials of study ordinarily used are clay, wood, metal, food, textiles, paper, and the like. Aside from the kind of work already indicated, opportunity also is usually given for constructive work from the standpoint of free expression at such stated times as Hallowe'en, Christmas, Easter, and as other occasions dictate.

Manipulative work frequently is given major emphasis, as far as the pupils are concerned, for it is believed by a majority (92.7 per cent) of the teachers concerned that the knowledge and appreciation

[1] See Bulletin on "Fundamental Values in Industrial Education," Teachers College, Columbia University, Publication.

most vital to their boys and girls are secured in this way. Nevertheless, undue stress need not be placed upon this phase of the work if *the problems and projects challenge mental as well as manual activity*. The experience to date indicates that a maximum of time preferably is given to elementary studies of the various industries, and that manipulative work should occur whenever it aids most in an understanding of the industry or in making the subject more interesting.

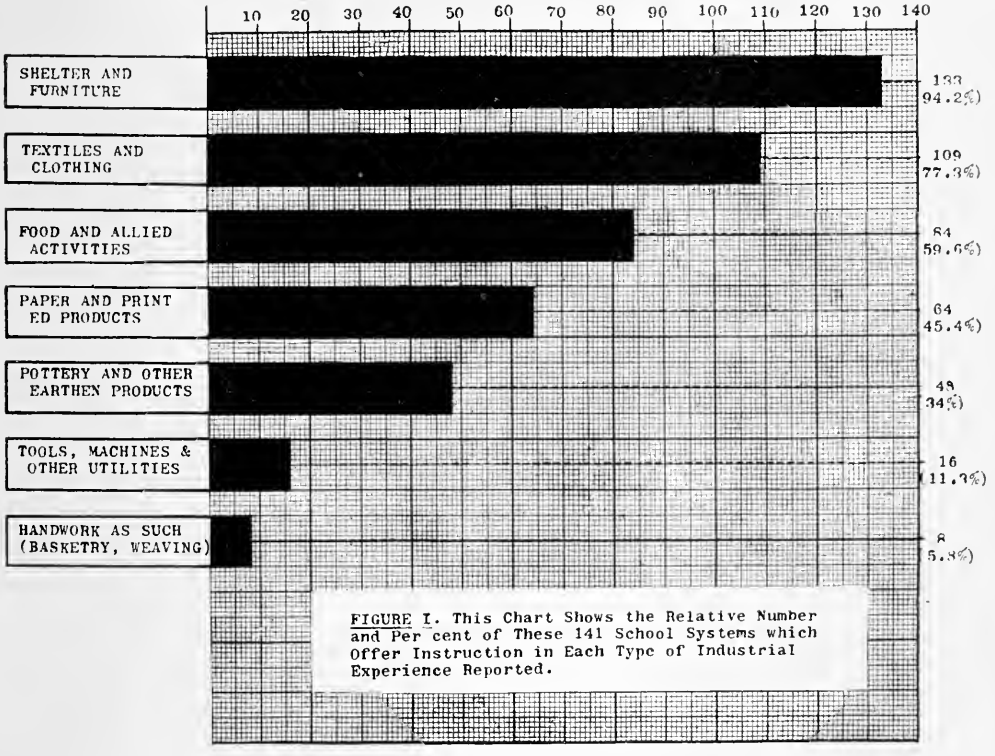

FIGURE I. This Chart Shows the Relative Number and Per cent of These 141 School Systems which Offer Instruction in Each Type of Industrial Experience Reported.

It is generally agreed that the actual "try out" courses for specialized interests and aptitudes, as such, may well be taken up intensively in grades above the sixth.[2] Several of these teachers state they believe it is desirable, however, by the time the child reaches the seventh grade (1) that he should have a fairly clear but general understanding of the production in the important industries which are being carried on about him; (2) that he should know something of the persons that are engaged in these industrial pursuits; and (3) that he should be somewhat acquainted with the possibilities that are open to him in such occupations. Questions concerning sources and preparation of materials, manufacturing processes, and the character and lives of the workers arise in a natural way, and, where these are given proper attention, will contribute materially to an intelligent understanding of present-day industry. Excursions, moving pictures, exhibits, selected readings, and discussions likewise become important factors in the development of this phase of the study.

Leon L. Winslow, who is specialist in

[2] Edgerton, A.H. "Industrial Arts and Prevocational Education in Our Intermediate and Junior High Schools," Industrial Arts Magazine, October, 1921.

drawing and industrial training for the New York State Department of Education, has stated clearly the relation which might well exist between the elementary industrial arts, the so-called fine arts, and other school subjects, as follows:

For the purpose of organization, most of the drawing (art) and construction work done in schools falls to the subject of industrial arts, not because it is a manual subject but rather because it is an industrial subject and because industry deals more with drawing and construction than do history or geography or arithmetic. As phases of school life, drawing and construction are at the disposal of all school studies, but the time has gone by when drawing and manual training can be advantageously regarded as separate subjects in the elementary school course. Either one is but a part of the subject which it is intended to clarify and intensify. We, therefore, choose to form the new subject of industrial arts by combining drawing and construction with an educative subject-matter relating to industry.

When the industry is once chosen, the class is put to work investigating it, collecting information from all possible sources. Much of the material is obtained thru actual contact with those engaged in it or who handle its product. Some facts will be gleamed from reference books. The topics to be considered will depend upon the information available and the ability of the class. The following outline is helpful in considering what may constitute the subject-matter in each industry studied: (1) The value of the industry to man; how we are affected by it, (2) The evolution of the industry; its story, its heroes of invention (history), (3) Characteristics of the product; what constitutes excellence. (4) Materials employed, where they come from, (geography), (5) Processes involved, (6) Tools used, (7) Healthfulness (hygiene), (8) Hours and wages, (9) The training of the workers, (10) The part played in the industry by arithmetic, (11) The part played by drawing and design, (12) References to the industry found in literature, (13) The industry as depicted in art.

The subject-matter of industrial arts includes such of the principles of art as are involved continually in each industry as it is taken up. Masterpieces in painting and sculpture considered as records made by man at various times and under varying conditions, will be treated from the aesthetic side, primarily. Art instruction will be amply provided for, and yet art will not be considered, as it has sometimes been in the past, as an end in itself

The handwork is based upon the subject-matter studied and its two kinds: (1) Drawing, including, color, representation and design; (2) construction, including the preparation and combination of materials. All projects are considered as means of expressing ideas and feelings gotten from a study of the activities and not merely as pieces of handwork to go along with the various studies. Handwork should always result from a definite purpose calling for it.[3]

In a few of the schools investigated a special arrangement has been made for the pupils from about eight to twelve years of age whereby they spend part of their time serving as "helpers" or "assistants" to the older pupils. This plan, which obviously offers limited educational value, is intended to give the younger children opportunity to acquire experience thru observation and very elementary participation.

PROPER CORRELATION ENRICHES ELEMENTARY SCHOOL CURRICULUM

It is pointed out by a number of educators that illustrative handwork is not necessarily industrial arts, as the former is mainly a means of arousing interest in and developing geography, history, and other school subjects. That is, they insist that this form of activity rarely deals with the study of the processes involved in changing raw materials into more valuable products in the industries, and, consequently, it cannot correctly be classified as strictly industrial arts education.

Altho the name of the study, after all, is not of first importance, *there unquestionably is need in elementary education for work and study which involve an elementary interpretation of the many vital but complicated industrial situations, conditions, and relationships that confront all citizens* garments; pottery from the clay banks to finished

[3] See Bulletin on "Art and Industrial Arts," a handbook for the elementary grade teachers, State Department of Education publication, Albany, N. Y.

and consumers, both early and late in life. In this connection, the industrial arts problems or projects, which are thought out, planned, and developed by the younger boys and girls, undoubtedly should be illustrative, at least, in so far as the illustrations help to develop the study of industries. At any rate, one striking feature observed more and more in the elementary industrial arts classes is the fact that this subject correlates easily and naturally with the rest of the school curricula. Much of this valuable work and study is being given during the history, geography, and reading periods. In fact, it is frequently the case that little special time is set aside for this industrial arts work in flexible school programs, because it is so closely interwoven with such subjects as those just mentioned. In order to realize the most value from these studies, however, it becomes necessary for each grade teacher to so aquaint herself with a knowledge of the important industries that she can seize the opportunity to effectively correlate the industrial arts with the other related school subjects.

Professor F. G. Bonser of Teachers College, Columbia University, has called our attention forcefully to this promising tendency in elementary education as follows:

> Not only are values developed in relationship to the industries themselves, but the immediate real, tangible materials of these activities and interests centering in everyday use create the needs for and the problems in most of the other school subjects. They make appreciable a reason for arithmetic and geography and history. Vitally inherent in them lie the problems of hygiene and sanitation. Much of nature study and science have their very reason for existence as school studies in the industrial problems whose solution is dependent upon them. Indeed, the study of the industries viewed aright is the very foundation upon which any effective organization of elementary education must be based or it will be abstract and remote from life. By the study of clothing materials and processes from the raw textile fibers to finished fabrics and china and other earthenwares; shelter from the forest to completed dwelling houses and their furnishings; or from quarry and mine to completed stone, concrete and steel edifices, large and small; books from the paper mill to the publisher's salesroom; and all of the various important fields of industrial production from raw materials to finished products, from simple, primitive methods to the complex machinofacture of the twentieth century, —by such study we have the approach to almost every phase of present-day life with means for interpreting it in terms of economic, esthetic, civic and social values.[4]

The proper teaching of the industrial arts, as already outlined, will not only enrich each closely related subject, but these subjects in turn will vitalize the study of industrial arts.

SUGGESTIVE TYPES OF THESE ELEMENTARY INDUSTRIAL ARTS ACTIVITIES

The following elementary industrial arts units were developed successfully in grades from one to six, inclusive, under the supervision of Miss Rosana Hunter, who formerly was an instructor of industrial arts at Indiana University and at present is affiliated with the Indianapolis, Indiana, Public Schools.

CLOTHING AND TEXTILES

(First Grade)

In the first grade, the study of textiles was necessarily of a very simple type. The main object was to convey to the children the idea that many of the useful, enjoyable things in life mean work upon the part of hundreds of people, and that the preparation of clothing and like material involves a great industry. Observation of the clothing that each child wore was made—how it was made up of tiny threads woven over and under each other. This same thought was applied to draperies, linen, bed clothing, and other textiles used in the homes. After the children had conceived the idea of what weaving really meant, the question was suggested as to how each tiny separate thread was made. A simple study of single threads of ravelings followed. By untwisting and twisting again to make

[4] Bonser, Frederick G. "Industrial Education in Present School Problems," School and Society, August 26, 1916, Vol. IV.

up a thread, the children were led to see that a thread was nothing more than a number of fibers twisted around each other. A story was then told of the great factories where just such twisting of fibers to make threads was performed. Pictures were brought in to help the children realize that such was the case. All of this finally led to the question as to where the first fibers were obtained, and stories of the sheep, flax and cotton were told. The children developed their own questions and problems, and consequently were most interested in solving and answering them.

After the twisting of threads was understood, the subject of weaving was again taken up. Pictures were used to show how this was done in large industrial plants. Manipulation became an important part of the work at this period. Some small looms were made with the help of the teacher by fastening four pieces of wood securely together in the form of a rectangle and notching the end pieces so that the warp threads could be strung around them. Upon these looms, the children wove small rugs for a doll house that had been made by the older pupils. Several children worked upon the same rug, for the method of weaving and not the finished product was the real object in mind. The idea of textiles was further carried out in connection with this doll house by the making of curtains, draperies, and bed linen.

This work was correlated with the story and reading periods by using the stories of the life of the sheep on the ranch, of a cotton plant, of Pippa, of Arachne, and numerous others of this type. In connection with the nature study work, the oriole's nest was observed. The spider was cited as a weaver, and the suggestion that the caterpillar might be called a weaver led to a talk about the silk worm. A window box was obtained and flax seed planted. This was watched with much zest by the children, and when the plants matured they took great interest in seeing how the fiber could be taken from the plant and twisted into threads.

SHELTER—WOOD

(Second Grade)

A study of the wood industry was begun with a socialized recitation about woods or, as we eventually called them, forests. The story of the "Pine Tree," by Hans Andersen, was told and the children were helped to realize what was really meant by a forest. Illustrative material in the form of pictures was abundantly used, the children bringing much of this from home.

Eventually the pine tree was singled out as a type and an elementary study was made of it and its characteristics. By story and illustration its life was carried along from the forest until it was cut down by the lumberman and brought to the lumber mill. Then the following steps were brought out, always in a manner that could be understood by the children: the cutting of the great planks from a log, the sawing and planing of the plank in the mill, the final making of the boards into houses, furniture, or other useful articles. The story of the carpenter was introduced here and carried out both in reading and in song. Illustrative material of lumber mills and saw mills was constantly used to impress upon the children the idea that the wood industry is an important part of the world's work.

The manipulative part of the work consisted of the making of a rather crude bird house from material that the children had brought in. The house was built for a wren, consequently it did not call for much material. The project was given the finishing touches by sand papering and by staining. The latter was done long before it was used in order that the odor might disappear before the birds wished to build. The staining of the house led to a discussion of the grain of wood, and one or two methods of finishing woods as carried on in furniture factories.

PAPER MAKING

(Third Grade)

The manipulative phase of the study of the paper industry consisted of making a small booklet that was used to hold school papers, which the children wished to save. In connection with this booklet, strawboard, cover paper, and binder's cloth were brought under observation. This easily led to a study on the part of the children to find out how books and paper were originally made and how they are made today.

The origin of paper making was taken up thru the story of the keeping of records by the ancient people of Asia, Greece, and Rome. The wax and clay tablets were discussed and their non-durability pointed out. The story of Egyptian paper making from papyrus was developed and this led to the story of the use of sheepskin, calfskin, flax, and cotton fibers for the same purpose. Illustrative material of old pamphlets that had been illustrated and printed by hand were shown. The invention of the printing press and the great demand for paper led up to the present manufacturing of paper.

In connection with the industry of today, the following points were emphasized: the obtaining of rags and the sorting of these, the securing of old paper and the combining of rags and paper, the cutting, mixing, rolling, drying, coloring, and finishing of paper. The difference between blotting paper, writing paper, cardboard, and tissue paper

was observed. The making of certain kinds of paper from wood fiber was correlated with the reading period. The children were keen enough to bring up the subject of the making of paper clothing during the last few years.

Some small boys undertook to try paper making at home by pulverizing rags and paper together and by boiling them in a little lye water with rosin to hold the fibers together. The result was a very heavy crude blotting paper that helped much in giving an idea as to how the work is done in the factory. Other children made up charts of samples of different kinds of paper that could be found. These charts were on exhibition in the schoolroom and were viewed with great pride by the makers. Helpful illustrative material for the study of this industry was obtained from the Hampshire Paper Company at South Hadley Falls, Mass., and the Forest Paper Company at Yarmouthville, Me.

FOOD

(Fourth Grade)

In the fourth grade, emphasis was laid upon the preparation of meats, and also of wheat as a ceral for our use. In connection with the former, the life of the rancher was taken up in the geography period. The beef was traced from the ranch to the stockyards and the packing house. Some time was given to the preparation of the meat after the beef was killed. Allen's Industrial Reader was used extensively with this work, and some very good material was obtained from Morris and Company in Chicago. (The latter contains excellent illustrations and carries the work along the different processes of refrigerating, drying, smoking, and canning). The place of this industry in the United States, the approximate number of people employed, and the location of the large stockyards and meat-packing establishments in this and other countries were studied. The story of the raising of sheep for food was taken up in much the same manner as that of the beef.

With the study of the cereal, the story of a grain of wheat was traced from the wheat fields of the northwest to the time when the loaf of bread, or the breakfast food, was placed upon the dining table. Consideration was given to the number of persons employed in this industry and its place in the world's work. Materials obtained from the Washburn-Crosby Company showing a diagram of the milling processes in the flour mill were found helpful. Stories of "How the World is Fed" were read and a comparison was made of the ancient ways of making flour and meal as compared with those of the present. The whole subject was further vitalized by a visit to a small flour mill nearby.

METALS—IRON AND STEEL

(Fifth Grade)

The fifth grade was studying the United States in geography. One of the important natural resources proved to be iron ore. One of the chief industries involved was the transforming of iron into steel. This gave us a splendid opportunity to investigate the iron industry. A study was made of the early discoveries of iron and its smelting by ancient people. The fact was brought out that in the history of civilization a certain epoch was known as the Iron Age, when people first began to substitute iron for wood and stone. The history of the smelting of iron was traced up to the present methods of manufacturing. Special attention was given to the difference between the open hearth and the Bessemer furnace. The effect of the iron industry upon civilization with regard to machinery, transportation, building, and tools was noted. Outstanding individuals who had done much to promote the industry were mentioned. The children learned that Neilson, Siemens, and Bessemer had as important an influence upon our lives as did Washington, Franklin, and many other men to whose lives so much time is given in the schoolroom.

By the time this study was completed, the children knew the main facts concerning the history of the iron industry, the names of the men who had promoted the industry, the different kinds of work, and the approximate wage of each worker in the industry. Since the workers of the metal industry are unionized, this led to a slight discussion of the union and its purpose. The discussion of the union led to introductory observations of factory working conditions and workmen's compensation laws.

The manipulative phase of this study of the metal industry consisted of the making of a lead paper weight. This was done by first making the mould of clay. The lead was then melted over a Bunsen flame and poured into the mould. After cooling, the mould was knocked off and the weight bore the imprint of any shape the mould may have been.

The idea of the work in the mills was made more vital by a set of stereopticon slides that was borrowed from the Illinois Steel Company of Chicago. These slides told the whole industrial story from the raw material to the finished product.

BRICK MAKING

(Sixth Grade)

The study of the clay industry in connection with the making of bricks was brought in thru the geography of Indiana. Since Brazil, Indiana, is a great brick-producing region, our interests were

naturally aroused with this kind of work. The making of brick was traced from early Egyptian and Assyrian times up to the present day. Much time was given to the development of this industry in our own country, and this work led to a study of the location of the large brick-producing regions of Indiana and the United States. The study of the processes of the industry involved the production of the raw material, its preparation for use, its tempering, and its moulding. Under the subject of moulding, the soft mud, stiff mud, and dry processes were discussed. Quite a little time was given to the subject of firing, and a visit to a brick kiln was made by the class.

After the class felt that it understood, to some extent, the different kinds of work in connection with this industry, the boys made a study of the approximate wage of the important processes, while the girls collected statistics concerning the number of persons employed and the necessary preparation required of a worker in order to be classed as a skilled workman. Of course, the fact that the workers are unionized was revealed, and, as in the iron industry in the fourth grade, this led to a discussion of factory conditions, hazards of the work, and seasonableness of employment.

The manipulative phase of the work consisted of the making of a small brick in a wooden mould. Each child made a mould and brought in clay for the work. The fact that these hand-made bricks shrank, and were not as large when dry as when wet, led to an interesting discussion as to how much a brick maker must allow for shrinkage. The bricks were not glazed and fired, but the subject of glazing was touched upon and the difference between common, pressed and enamelled bricks was pointed out.

During this study the children kept note books, so that a definite check was had as to how much they were really learning from the discussions and readings. Stereopticon slides of other clay industries were also used to aid in impressing upon them the importance of this particular industry.

While it is encouraging to note these promising results in method and procedure, which tend to show that *we have frequently underestimated the ability of children from 6 to 12 years of age*, it certainly would be unwise, at this time, to consider any feasible plan for offering elementary industrial arts instruction as more than tentative. These excellent results should at least point the way for further experimentation, which is certain to make more reliable comparisons and measurements possible as the work develops.

II. Correlating and Developing Units of Work and Study

Need for careful study and impartial experimentation

DESPITE the many encouraging readjustments and tendencies pointed out in the preceding chapter relative to the purpose and content of profitable industrial experiences in the elementary grades of 141 public school systems, Table II shows that a wide range of opinion still exists as to the actual methods to be employed in realizing any one of these generally accepted objectives. It is to be hoped that the time is not far distant when careful study and impartial experimentation may aid us in determining the comparative values of our most feasible methods by fairly and thoroly testing them in some definite way. However, until more accurate means have been devised for ascertaining the truth (facts, rather than mere opinions) regarding *what and how pupils from approximately 6 to 12 years of age can learn most effectively and economically*, it behooves those who are responsible for organizing and conducting the industrial arts activities to select and try out various appropriate methods and practices, as conditions permit, in order that the results may be carefully observed, tested, and compared whenever possible.

It is hoped that the different types of successfully tried units and projects, which are published in the following manner by special request, will prove sufficiently suggestive to challenge a large number of teachers to try them out as stated or in modified form. These accurately reported units of work have been collected intentionally from individuals having somewhat varied points of view and experience, with the thought that the results obtained and the means employed might interest those concerned and encourage further experimentation with the several plans for realizing common aims or purposes.

TABLE II. 352 grade teachers report their respective methods for correlating the industrial arts to make English (oral and written) a true growth of each pupil's experience.[5]

ITEM	NO.	
1. Each pupil is encouraged to become interested in expressing himself in a clear manner during industrial arts talks and discussions		126
2. Each pupil is required to write up excursions to industrial plants, make class reports and notes in accepted English for his grade and in a form which has been agreed upon as satisfactory by all concerned		98
3. Each pupil studies and, wherever possible, uses accepted business forms and practices to become familiar with the related commercial aspects of the various industries		83
4. Each pupil is taught to select and evaluate the most important information from the selected readings:		
a. Those readings which are assigned for the purpose of giving definite information and attendant technic directly related to the construction work done	45	
b. Those readings which do not directly affect the construction work, but give understanding, insight, and inquiring attitudes of mind in connection with occupational activities in every day life	34	79

Contributions to and from Closely Related Subjects in Curriculum

The far-reaching possibilities in enriching the elementary school curriculum

[5]These numbers will total more than 352, as several teachers reported more than one method.

by properly correlating the industrial arts activities with such closely related tool and content subjects as English, geography, history, nature-study, arithmetic, and the fine arts were suggested in the introductory chapter. Figure 2 shows the number of school systems attempting such correlations. In the most effective teaching of this nature observed, each subject was studied and developed in terms of its relationship to fundamental needs. The industrial activity was not only emphasized and conducted in its true perspective, but it was utilized to an extent that could be justified by its relative worth in each specific case. It likewise was observed that the content of these closely related subjects was greatly vitalized by utilizing the industrial arts work. Table II indicates a number of these relationships which 352 grade teachers utilized in order to help pupils make their oral and written speech more effective. Altho each subject must have its own objectives and subject-matter in the classroom, and naturally will subordinate the other, in emphasis at times, nevertheless, any one of the subjects mentioned will lose much of its inherent value provided it neglects to utilize the other subjects advantageously to enrich its own particular aspect of the study.

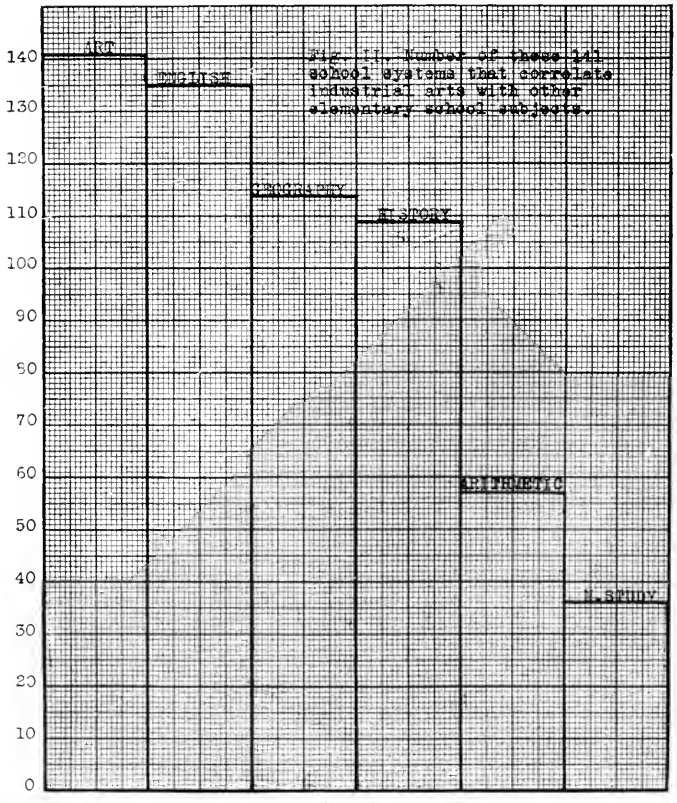

FIG. 2.

REPORTS ON SUCCESSFULLY DEVELOPED CORRELATIONS

The following widely varied reports are suggestive of a few of the valuable correlations which have resulted from resourceful teaching.

MAKING A HOME—GRADE I

EDITH M. PARSONS,
Teacher at Youngstown, Ohio

This undirected community work was carried out by a first-grade class of forty foreign children, most of whom were from crowded and unkept homes. My aim was to derive as much pleasure and profit for these children as possible; while the children desired to model a home and its environments.

Conversation first took place concerning the home and uses of furniture. As there were no furniture stores near enough for us to visit, I put colored furniture plates, catalogs, and magazines in convenient places, for the pupils' inspection. After many suggestions and discussions the following was decided upon by vote: (a) Size of house, (b) its color, (c) the kind of furniture, (d) the kind of floor and wall coverings, (e) the place of the garden, (f) the decoration of the front yard, (g) who was to make each part.

The educational values realized from this study were briefly as follows:

1. Language—Conversation and criticisms.
2. Number—counting, costs, and measuring.
3. Nature study—seed and germination; the value of rain, air, and sunshine; the value of toads, snakes, and insects that live in gardens.
4. Health—value of foods grown in a garden; ventilation and cleanliness in home keeping.
5. Citizenship—voting and cheerfully abiding by the decision of the majority.
6. Writing—the necessary work in planning, costs, and the like.

Equally important with the above were the following social adjustments:

1. Added ability to work together.
2. The appreciation of the good work of another.
3. The ability to take and give criticism.
4. The ability to help one another.
5. The creation of a feeling of responsibility for a completed task.
6. Concentration and independence of thought.

CLOTHING AND TEXTILES—GRADES I AND II

PEARL G. CANDEE
Supervisor of Industrial Arts, Niagara Falls, N. Y.

In the public school, we can no longer separate art and industry from their proper relation to every subject taught in the elementary grade curriculum. During the past two years Niagara Falls has introduced problems in industrial arts into its grade school course of study, endeavoring to give the child some knowledge of the industry studied and the direct relation of arithmetic, geography, drawing, and other subjects to it. For instance, the making of designs for silk material is preceded by all of the appropriate knowledge obtainable about the silk industry. The following is a typical outline for one subject (textiles), which was used in grades I and II last year.

Grade I.

(a) Discussion of clothing to be worn at various times of year, as to kinds, material, color, etc.

(b) Paper dolls were cut from patterns. Costumes for summer, winter, fall, and spring were made from colored construction paper and trimmed (original designs).

Grades II.

(a) Discussions of clothing worn by people of various lands included

1. Of what the materials are made.
2. How the materials are obtained.
3. Where the materials are obtained.
4. The color combinations used.

(b) Paper dolls were cut from patterns. Costumes representing children of various lands were made from colored construction paper.

(c) This study was correlated with story illustrations and geography.

FOOD AND TEXTILES—GRADES I AND II

CARRIE R. HARMON
Supervisor of Industrial Arts, Lockport, New York

We feel that the industrial arts plan is of greater value than the former courses in drawing and construction work because, first, a new interest is created in the manufactured articles all about us and in all industry; second, in the appreciation of what is good in design in the manufactured articles; third, in the appreciation of the masterpieces in painting and song related to each industry that is studied; third, thru its correlation with other subjects in the curriculum, increasing the interest in those subjects. It also increases the interest of the parents in the work of the school, as the children solicit them for information about the subject being studied and for magazines from which to cut pictures to illustrate their subjects.

In each subject in every grade, representation, design, color, and the construction work are included as before. Under food, the studies include the source of supply, the cost, the nutritive value and, in some classes, the method of preparation, setting the table properly, and the artistic arrangement of flowers to adorn it. In the second grade, dishes were recently cut from paper and the napkins arranged on the paper table cloth in their proper places. The proper amount of and the right kind

of food were discussed with them. "A quart a day on every child's tray" is illustrated by posters, as we are at present having a "Milk Week" campaign to show the value of milk to all, and its cheapness as compared with other foods.

Textiles studied for two months included work as follows: first grade, wool; second grade, cotton; third grade, silk; fourth grade, linen; fifth grade, cordage; sixth grade, dress design. The first grade was able to tell the steps in the process of making cloth from the shearing of sheep to the dyeing of the wool or cloth.

We have used as reference books for these studies the booklet, "From Wool to Cloth," which is published by the American Woolen Company and sent free to schools, "How the World is Clothed," and other books that were loaned to us by the State Department of Education at Albany, New York.

In the first grade, sheep are cut from paper and mounted on the booklet covers or they are included in posters, or a nursery rhyme such as "Little Bo-Peep" is illustrated. Color and design are included in single form by the stick printing of a design on the booklet cover, or in making a design for a woven rug. Bright-colored yarn in one or more of the six colors is sewed on burlap in the darning stitch. This year, instead, we are making little woolen bootees woven on cardboard looms.

ILLUSTRATIVE PROJECTS—GRADE III

Georgia Ames Kelley
Teacher at Hillside School, Berkeley, California

The objective of this project, which was worked out at the Hillside School, was the study of Eskimo life thru the making, dressing, and housing of an Eskimo doll. In order to secure a background for the project, the teacher and third-grade children first secured pictures, books, and relics of Eskimo life. These books and pictures were placed on the reading table, where the children might have access to them at any time after the prescribed work had been completed. During the language period, the facts gleaned thru the silent reading were presented and discussed by the children. These discussions were in the form of socialized recitations, as the initiative was taken by the children. They also criticized and judged the value of the material presented. During these discussions, the children not only helped correct the poor English by substituting the correct forms, but they also commended excellent forms of expression.

The next step was the organization, on the part of the class, of all the material under a few topic-heads: 1. The country, its climate, resources, etc. 2. The people, their homes, clothing, occupations, etc. 3. The present compared with the past. The class then divided itself into groups in relation to the topics in which the different individuals were most interested. Each group worked by itself to organize the material of the particular topic into a complete story. This story was afterwards presented to the class, sometimes by members of the group and sometimes by one child whom they chose. Members of the class then wrote compositions and stories upon the various topics. This involved the use of many new words, which the children had selected from day to day and placed upon the blackboard for reference. Besides this fact, material, stories, poems, and songs about Eskimo life were collected, and many of them were learned.

During the entire period (about six weeks), the construction work, involved in the completion of the project, was carried on. At each stage of progress, the work of the individual members and of the groups was presented for criticism and suggestion, and the class decided on the final products to be used. The manual work was surprisingly good for such young children. Practically all of the subjects in the curriculum for the third grade were taught thru this project. In fact, the arithmetic was the only subject for which extra work was provided. The children were keenly interested and attacked each new problem, whether it was constructing bases for the Eskimo houses in the manual training room or learning a list of difficult words, with equal enthusiasm and determination.

I. The making and dressing of an Eskimo doll was carried out involving:

1. Studies of pictures and representations of Eskimo life.
2. Modeling an Eskimo doll (a study in proportion).
3. Constructing a doll from brown ticking (designing, cutting, and sewing).
4. Planning the clothes for the doll (cutting patterns).
5. Selecting materials and the making of clothes (overhand stitch used, suggested by primitive method of sewing skins).

II. The making of an Eskimo house consisted of:

1. Studies of pictures of Eskimo houses.
2. Drawing pictures of these on paper and the blackboard.
3. Modeling the house in sand, or from modelline, etc.

III. A sand-table representation of an Eskimo village by the class, included:

1. The original plans which were drawn on paper and transferred to a board. (Each child explained his particular plan to the class. These plans were then dis-

cussed and the best one retained as a working basis. This plan was kept on the board until the sand-table representation was completed).

2. The composition of the representations included:
   a. Landscape, houses, and people.
   b. Water, boats, etc.
   c. Animals, dog-teams, etc.

IV. Individual representations were also made on a smaller scale.

1. A program for the parents which was arranged by the children. (It included a complete unified review of the subject, thru poems, songs, compositions and stories, conducted in the same way as the daily recitations).
2. An exhibit showing all the things made and collected. (These were arranged by the children, who acted as guides to the visitors).

RELATED PROJECTS—GRADE III

Georgia Ames Kelley
Teacher at the Hillside School, Berkeley, California

The objectives of another project were to put content, thru actual experiences, into the terms "cost," "selling price," "loss and gain," and also to test the knowledge of all the addition and subtraction combinations, if possible. The class was studying a community, i. e. small town and farms. It was suggested that the class build a town so that they might buy and sell the different commodities necessary to daily life. Out of this suggestion grew an elaborate community, a town and adjoining farms. The farm produce, cattle and hogs, sheep, poultry, etc. were sold to the markets, and they, in turn, resold them to the consumers. The town bank loaned the money to carry on these enterprises, and also took deposits of money. There were public markets, a candy store, a grocery store, a bakery, and real estate firms. Adjoining the town were a chicken ranch, a hog ranch, a dairy, and a fruit and vegetable farm.

For the construction of the town and farms, the class divided itself into groups according to the enterprise which they wished to carry on. The children worked out their own ideas, constructing the stores, furniture, and the articles to be bought and sold. They laid out the farms, built the houses, and made the animals, people, etc. Catalogs were consulted as to fair selling prices, and prices were plainly marked on everything. Posters were used to advertise special sales. Large quantities of money of all denominations were made for the use of the bank. During the arithmetic period, actual buying and selling was carried on. Each group selected one of its members to "keep shop," while the others went out to trade. At the end of the period, each child figured up his transactions to see what his profits or losses were and settled his account at the bank. Some of these problems were written on the board and the entire class aided in their solution.

The following subject correlations were involved:

I. The industrial arts studies included cardboard and paper construction, woodwork, modeling, sand-table representations, drawing, painting, and printing.

II. The arithmetic work included problems in addition, subtraction, multiplication, fractional parts, U. S. money, reading and writing, and making correct change. This work helped the pupils to understand and use such terms as "cost," "selling price," and "profit and loss."

III. The language work included:

1. Oral expression, thru discussion of project, names for towns, stores, and farms, stating of problems, etc.
2. Written forms in making out bills, writing advertisements, etc.

SHELTER AND FOOD—GRADE IV

Mrs. Lois Coffey-Mossman
Instructor of Elementary Education
Teachers College, Columbia University
New York City

A group of fourth-grade children in New York City studied the Virginia colony. In reading the simple stories written about these colonists, it seemed that the children were not aware of the real life problems involved. So the teacher questioned them as to what the colonists ate and the sort of houses in which they lived. It was found that most of these children had never seen shingles on a house and had little or no notion as to what a log is. A small model of a log cabin was brought into the room and left where it might be examined by them day after day whenever time availed. This led to questions about making trees into logs and boards. To answer these satisfactorily pictures of trees, lumber camps, and saw mills were used.

At first these children thought that probably sufficient flour was brought in the ship in which the colonists came to this country to supply them indefinitely with bread materials. When some notion of the size of the ship was obtained by comparing it with ships anchored in the Hudson River, they were forced to find another source of bread for these pioneers. They found that corn was secured from the Indians and made first into meal and then into bread. But these children had never

seen ripe corn. A few ears were secured and it was interesting to see their eagerness to help shell it, or even to get a kernel in their hands.

This shelled corn was ground into meal by the pupils and then made into corn bread, the bread being mixed in the classroom and baked in a neighboring oven. Finally the bread was eaten with honey, and thus the children gained some notion of a number of the difficulties which confronted the Virginia colonists.

ILLUSTRATIVE PROJECTS —GRADES IV AND V

Carrie B. Francis
Supervisor of Industrial Arts, Indianapolis, Indiana

The fourth and fifth grades in the Ralph Waldo Emerson School of Indianapolis worked out an interesting project during the spring semester, 1920. This project was based on the geography work of the schools with two specific purposes in view; first, to enable the child to translate into terms of his own experience something of the life and conditions of the people whom he was studying, and, second, to stimulate an increased interest in the other subjects correlated with the work.

The story of the project developed was as follows: "An American child was sitting beside the fireplace in his own home. As he sat there, he fell asleep and dreamed a wonderful dream. He was in a great airplane and as he sailed along he saw many strange and curious sights. The child first visited the frozen north, where he saw massive icebergs, the brilliant northern lights, all the strange animals, the snow houses, and Esquimos, who live in them.

"Next he visited a farm in the Temperate Zone. From there he was quickly transported to Japan amid the beauties of the cherry blossoms and the gorgeous, gayly dressed Japanese. In striking contrast, he soon saw the more somber colorings of an Arabian desert with its white gowned Arabs and slow-moving camels. But, most delightful of all, he found himself in the depths of a dense jungle, where he saw peering out from the tall grass all the animals that gave him such thrills when the circus came to town."

The boys in their manual training classes made all of the animals, homes of the peoples, vehicles of transportation, and the like for each scene of the dream. The girls in the sewing classes costumed clothes-pin dolls for the homes. In the art classes, cut-paper landscapes were made to show the settings for the scenes. The pose work was based upon the people living in these homes. At the end of the semester, large stages, replicas of the landscapes, were made, and homes, animals, people, etc. were placed in their individual settings with the American child in the plane above them flying from the North Frigid Zone to the Torrid Zone.

This work and study aroused the keenest interest and much enthusiasm, which was felt not alone by pupils in the schoolroom, but also by the parents in the homes. This interest in the work served to bring the school and the home in much closer touch with each other. As the grades worked together on this problem, a splendid co-operative spirit was developed. This co-operative spirit should tend to broaden the child's interpretation of life and aid him to more wisely adjust himself to the outside world.

CORRELATED FOOD PROJECT —GRADE V

Mabel Hutchins
Teacher of Industrial Arts
Grand Rapids, Michigan

This project consisted of the cooking and serving of a Colonial luncheon as part of the Tercentenary Celebration of the Landing of the Pilgrims. It is one example of the natural correlation of industrial arts with the other subjects. The industrial arts included work and study resulting in the pouring and dipping of tallow candles, making soap, investigating Colonial foods, their food values, and composition, cooking utensils and dishes, planning a balanced menu for a luncheon, and finally cooking and serving it correctly. Related art problems consisted of charts showing composition of typical foods, cut-paper designs for table-top and hand-lettered menu and place cards.

The history work involved an intensive study of the Colonial Period and the development of cooking methods; the language work included the writing of papers on the subject-matter, and oral compositions on the lantern slides; the geography studies helped the children to realize the sources of typical foods, the difference between Colonial and modern methods of transportation, and the interdependence of the nations; while the arithmetic was vitalized by practical problems in marketing, comparing costs of food and fuels, figuring food values, averages, and percentages.

In the hygiene class early methods of sanitation were compared with modern methods, the value of food to the body was emphasized, and (along with the making of soap) personal cleanliness was taught. The related science allowed time for simple chemical tests for food elements; the nature study was responsible for classifying the kinds of food native to the community, and a consideration of agriculture was made to allow for a study of the methods of production. Finally, the children were taught table manners, table service, and courtesy.

CLASS PROJECTS—GRADE VI

A. A. Cain
Ethical Culture School, New York City

At the Ethical Culture School, New York City, we have found that a study of the elements of electricity interests the pupils of our sixth grade. A choice is permitted in making a motor, telegraph, Bell telephone, wireless telegraph, or electric toaster. Men whose names are prominent in the field of electricity are studied and as much information as possible collected. This also creates a keener interest in the geography work when transportation, and modern facilities for travel are discussed.

Subjects are related in many ways, and the teachers in the different departments assist one another as occasions arise for developing some part of the work to a point of greater educational value. To illustrate this, I shall refer to a particular case. The sixth-grade class teacher had reached the point in geography where travel and lumber are associated. One of the shop teachers had been interviewed and arrangements were made for a talk on lumber, concerning where some of the common kinds grow, how to tell the different kinds, and something about the commercial lumber industry in general. This information cleaned up some mathematical difficulties by pointing out the sizes of boards and the commercial methods for figuring costs. At the same time, the shop benefited by showing the pupils the structural elements of wood, as there is seldom time during shop periods for such discussions.

From our experiments, it would seem that the work has a much greater educational value when there can be the closest possible relationship between the activities of the classroom and the work of the shop.

STIMULATING A STUDY OF ARCHITECTURE—GRADE VI

L. A. Herr
Supervisor of Elementary Industrial Arts
The Lincoln School, New York City

Thru the study of medieval history and a trip to the Metropolitan Museum, the sixth-grade class became interested in historic ornament. They decided to make some of the most typical and beautiful of the historic forms in plaster. The aim was to make these as true to the best examples as possible. Both teacher and pupils collected drawings and pictures from which each pupil made a choice of the particular ornament he wished to make. Borders such as egg and dart, the bead and button, and the guilloche were the choice of the majority of the pupils, altho some selected different kinds of ornament.

The work fell into three natural divisions, namely:

(1) Modeling of the desired form in clay;

(2) The making of a plaster mold from the clay model;

(3) The making of the finished cast from the mold.

Each pupil began by making a full-sized pencil sketch of the form which was used as a guide in the modeling. When the forms had been partially built up, several pupils cut templets to assist them in securing greater accuracy in their work. In preparing the temporary walls about the forms and in mixing and pouring the plaster, the pupils obtained good results by working in small groups and assisting each other. This work led to an extended study of architecture from the classic to the modern period. This study of architecture was successfully carried on by means of class discussions, sketching, lantern slides, and visits to typical buildings.

Relation Between Construction Problems and Intellectual Content

The majority of the primary teachers report that they experience little difficulty in stimulating their pupils to select and develop suitable construction problems to aid in the elementary industrial arts studies. On the other hand, they have observed that the ability of these younger children to understand is usually far greater than their technic. While a much greater degree of precision and accuracy can be encouraged beyond the third grade, it is exceedingly important for all teachers of elementary industrial arts to distinguish clearly between those manual aspects of the work which are intended primarily to result in motor skill (power over technic) and those which contribute mainly to general mental development.

Mrs. Coffey-Mossman, Instructor in Elementary Education at Teachers College, Columbia University, has referred to the relation which might well exist between the subject-matter and the construction work as follows:

To be worthy of a place in the school program, industrial arts should be able to show that it has a body of thought of its own. Some have regarded it as merely the handmaiden of the other school subjects to make them clearer and more interesting. If this is true, the work should be embodied in the respective subjects, just as maps, charts, lantern slides, and stereographs are used now. But industrial arts has a subject-matter of its own. It is a study which has to do with the activity of the race in transforming raw materials to meet definite needs. . . . . The growth of the race in developing better ways of meeting these needs; the materials which have been found best suited to the needs; the limitations, the qualities, the methods of producing, and the supply of these materials; the devices for making the things needed with their underlying scientific principles; and the effect upon man both of making and of using these products constitute a rich field of human activity worthy of study.

The making of a thing best enables one to understand it. To study the need as a problem until one can invent a way to meet the need is good, but the child cannot, in his short life, rediscover all the ways in which man has met these needs. He should then make the projects involved in his study whenever there is no easier way to get the idea as clearly as he should have it. This will necessitate evaluating every project upon the worth of the idea which it gives, upon the amount of time required, and upon the possibility of a quicker way of securing the idea—thru reading about it, being told, seeing pictures, or seeing some one else make it. If the "inner felt" series of sensations of which Professor James speaks is the only way to get the correct idea, then take the time for making the project. Projects in this subject exist then for the sake of clarifying ideas and giving the child a real understanding and appreciation of the industrial activity."*

*Coffey-Mossman, Lois, "The Organization of the Curriculum in Industrial Arts in the Elementary School," Bulletin of the Teachers College Alumni Conferences, Columbia University, New York City, 1913, pp. 80-81.

Nearly all of the teachers questioned on this subject disagree with the following statement, which was made recently by one of our well known educators: "The educational value is meagre in most of the so-called elementary grade industrial work, because it is relatively devoid of intellectual content." Invariably, they have stated that thru the group and individual projects, several of which are included in these reports, they are demonstrating daily the presence of such intellectual content by having the pupils not only participate in manipulative work, but also gain an intelligent appreciation of what the various problems, methods, and conditions mean in terms of historical development, social worth, scientific changes, and industrial growth. In other words, these purposeful activities are constantly challenging the pupils to think, plan, speak, write, and read, as well as to use materials and tools to construct servicable and interesting products.

III. Methods of Offering Project-Problem Instruction

Industrial Experiences Involve Three Closely Related Elements

As previously indicated, varying degrees of emphasis are being given to the relative values of construction work and subject-matter by the six elementary grades in the school systems investigated. Nevertheless, with few exceptions, these 352 teachers report that they recognize the need for having the industrial arts experiences give some attention to each one of the following closely related elements:

(1) *Motor expression* as a means of stimulating interest and mental activity, and of developing the muscles and senses to a reasonable degree (dexterity and discrimination);

(2) *Information* regarding common industrial materials, processes, products, and developments to make pupils conscious of important divisions and relationships in their complex social environment;

(3) *Situations* involving some understanding of the human factors (problems, conditions, and meanings) in the workaday world to encourage thoughtful appreciation of the possibilities for social service and individual expression.

In the teaching of industrial arts and related subjects, it is not uncommon to observe two widely divergent methods of learning in different elementary schools within the same school system, and even in different classrooms within the same building. Several of the grade and special teachers still follow the traditional method of assuming almost the entire responsibility for originating and announcing the object of the lesson, for making the plans, and for asking the pupils to assist in the execution of these. However, a large majority of the teachers concerned in this investigation report that, whenever possible, they encourage the pupils to set up purposes and to think out and develop plans on their own initiative.

Project-Problem Method of Learning and of Industrial Arts Instruction

The project-problem method of learning is favored in principle by approximately 91 per cent of the special and regular elementary school teachers in the 141 school systems studied. This generally recognized method, which has received such wide interpretation recently, preferably involves the conscious setting up of specific purposes by the pupils, the making of plans to realize these purposes, the execution of the plans developed, and, if possible, the appraisal of the results obtained. As would be expected, a considerable difference of opinion exists among these teachers as to the amount of responsibility in purposing and planning which can be profitably transferred from the teachers to the pupils. On the other hand, nearly all of these teachers seriously believe that *industrial experiences should not merely limit pupils to either narrow or imposed tasks in handwork, but should offer sufficient opportunity for understanding and appreciating the worth of each activity and interest*, as well as for allowing some freedom in meeting the difficulties which arise in developing their own problems. While it is important that the pupils learn to follow directions and to conscientiously and accurately perform those tasks which are assigned to them, it is agreed that these *requirements should not be over-emphasized to the sacrifice of that development in initiative which makes for the proper expression of personality in either group or individual projects.*

Director H. G. Lull of the Kansas State Normal School, Emporia, Kansas, has suggested the following method of procedure in project teaching: "The procedure, of course, will vary with the nature of the project, yet there are certain

principles to be observed in the initiation of all projects. In the first place, the teacher should recognize the principle that the pupil's natural and relatively unhampered attack upon the lesson is an essential condition of successful learning. By natural attack is not meant the absence of definite purpose in the attack nor of guiding suggestions by the teacher, but it does imply the removal of authoritative directions and prescriptions into the background. In the second place, the teacher and the pupils must recognize the following requirements as absolutely essential in starting a project: First, the pupils must work as a social group, in closest co-operation with one another; second, they must find a worthy purpose and make plans to realize it; third, as far as possible, they should make a tentative outline of the project as a means of guiding the individuals of the class in their study; and fourth, they should distribute the work of the project among themselves, which is to be done in the following study (or work) period."[6]

It is encouraging to note that this form of purposeful teaching—call it whatever you may choose—not merely recognizes the existence of knowledge, thinking power, and skill, as such, but places a premium on their proper expression and use without neglecting the physiological and psychological factors of child development. When properly conducted with respect to the needs and interests of the boys and girls, who have much work in common at this age, group and personal planning and experimenting occupy an all-important place in the industrial arts projects and problems. Dr. John Dewey has referred to these promising industrial activities as "ideal occasions for sense-training and discipline in thought." In continuing his discussion on "The Psychology of Occupations," he states: "Because the ordinary lessons in observation have no particular motive, there is no outlet beyond themselves. If there are no real needs and motives for doing a thing, sense-training becomes a mere gymnastic, and easily degenerates itself into knacks, or tricks, in observation. This means that it is a mere excitement of the sense organs. Normal thinking arises to meet some difficulty, but reflecting is the best way to overcome it. This should lead to planning for results to be reached. Certain steps and order are necessary."

Brief Reports on Successful Industrial Arts Projects and Problems[7]

The following reports on the several types of successfully tried projects should prove suggestive to all teachers and administrators who have the responsibility for developing industrial arts activities in grades one to six, inclusive.

Types of First, Second, and Third Grade Work

A PLAYHOUSE PROJECT—GRADE I

L. A. Herr

Supervisor of Elementary Industrial Arts
The Lincoln School, New York City

The first grade made a playhouse, using a piano box for a beginning. In planning the various features of the house, the class worked as a group. In executing the plans agreed upon in these group discussions, smaller groups chose different tasks. Freedom to shift from one type of work to another was encouraged so that every child gained many kinds of experience.

[6] Lull, H. G. "The Project Method of Learning," Kansas State Normal School publication; also see Kilpatrick and others. "Dangers and Difficulties of the Project Method and How to Overcome Them—A Symposium," Teachers College (Columbia University) Record, Vol. 22, pp. 283-322.

[7] It is appreciated that an elaboration of the details involved in each one of these units would be both interesting and profitable if the space could permit; however, the contributors have usually indicated that they will answer specific questions regarding their procedure and results.

Working in this way, a new floor was laid and paint was applied to the inside walls and ceiling. Measurements for a rug were taken and after its size had been determined and the material selected, weaving was begun on a hand-made loom. At first the work was done in the simplest way, neither heddle, batten, nor shuttle being used. After the pupil had gained some experience, these features were then added. While this work was in progress, another group made furniture consisting of four chairs and a table; another made draperies for the windows; still another made clay dishes to be used in future social functions to be held in the house.

Thus it will be seen that in the working out of this project and the different problems involved, the pupils gained firsthand experience with important building material, with clay as a potter's material, and with textile materials. While the dominant interest of the class was in the making and the using of these products, much information concerning the character and the qualities of the materials, as well as the methods of converting these usable articles, came as a by-product and formed a basis for further study.

BOOKS AND OTHER RECORDS—GRADE II

Leon Loyal Winslow
State Department of Education, Albany, N. Y.
(Formerly in Charge of Industrial Arts at the State Normal College, Bowling Green, Ohio)

In the second grade, a preliminary observation was made of our school books, involving the story of how we came to have books; tradition by word of mouth, covenants, the scroll, the folded sheet, laced sheets, the book; the bookbinder and the materials which he uses: paper, leather, cloth, thread, glue, paste; the tools necessary for simple bookmaking; pencil, ruler, scissors, and how they are used; and the care of books. Single-signature, flexible-covered pamphlets were made by each child to be used for picture study illustrations.[8] Fastening together in an attractive way the drawings made in the course, and making a simple-line cover design with appropriate, lettered titles, also were satisfactorily accomplished by the pupils in this grade.

CORN PROJECT—GRADE II

Nellie Mae Lockhart
Washington School, Youngstown, Ohio

The purpose of this project was to show the children the great value of corn and to emphasize the extent to which it is used in their everyday lives. We first compared the Indian methods of preparing corn with our modern methods. In order to accomplish this, some of the children ground corn between stones as the Indians did; while others brought in cornstalks and pictures of modern machinery. We then talked of the growth and care of corn. The pupils drew pictures of it and of the farmer at work. Some of the children who lived on farms made silos and told interesting stories of the preparation of corn for the silo.

Next, we studied the different products of corn and mounted many of them on a large chart. Samples of these products were brought in or, where these were not obtainable, the children read advertisements and mounted the pictures selected. Health posters and illustrated booklets comparing the food values of corn with other foods were made and taken home. After studying these products, we took up other uses of corn. To their surprise, they found they could make baskets, dolls, brooms, and the like from the husks. All thru this work, we tried to discover the time and interpret the value of the work done by farmers and manufacturers in preparing corn and its products, so that we as consumers might receive the benefits. In this way, the children found plenty of interesting material for reading, arithmetic, language, spelling, drawing, health talks, and constructive work.

Some of the activities displayed on the large class poster were as follows:

1. Dolls.
2. Brooms.
3. Corn-cob pipes.
4. Baskets.
5. Paper pulp.
6. Silos.
7. Health booklets.
8. Karo syrup and candy.
9. Corn bread.
10. Corn meal.
11. Mazola oils.
12. Corn starch.
13. Corn flakes.
14. Chicken corn.
15. Hominy.
16. Popcorn.
17. Popcorn balls.

We had expected to make candy from the corn syrup, to pop corn, and to make popcorn balls, but we lacked the necessary equipment at school.

POTTERY AND CHINAWARE—GRADE III

Effie Alexander
Primary Supervisor, Adrian, Michigan

The teacher's general aim was to arouse or increase the interest of her third grade children in some of the common manufactured products in everyday use, and to show them how these things are the result of interesting industrial processes. It seemed desirable to lead the pupils to appreciate the skill and perseverance of the laborers, and the dependence of one worker upon others. In order

[8] Winslow, Leon L. Chapter 4 on "The Interpretation and appreciation of Pictures" in bulletin on "Art and Industrial Arts," published by State Dept. of Education, Albany, N. Y.

to accomplish these ends, it was decided to consider how pottery was once made by hand and how it is made in the factories today. The pupils wished to learn how pottery is made in order to make bowls in which to put the bulbs that they were going to give their mothers. The illustrative material used in this study consisted of pictures of the potter's wheel, pictures of the potter at work, pictures of the kiln, pictures of pottery, pictures of Indian women decorating pottery, plaster-of-paris molds for castings, and Indian pottery and baskets.

The reference books used most freely were: *Elementary Industrial Arts*, by Leon L. Winslow; *Makers of Many Things*, by Eva March Tappan; Edson-Laing Readers, Book Three; *Indians of the Southwest*, by Pliny Goddard; and *The World Book*.

The general arrangement of the ten lessons, which were developed with interest and satisfactory results, was as follows:

I. Story of the way in which the Indians made pottery.
Pictures of Indian pottery.
II. How pottery is made today.
Picture of potter's wheels.
Pictures of potters at work.
Pictures of a kiln.
Showing plaster-of-paris molds.
III. Cutting of silhouettes.
Study of designs from pictures, pottery, and baskets.
IV. Making units and placing designs on silhouette.
V. Beginning bowl: making bottom and putting on one coil.
VI. Finishing building up bowl.
VII. Smoothing bowl; getting it ready for decoration.
VIII. Scratching design of border on bowl with a sharp nail.
IX. Firing pottery out-of-doors in a large iron covered kettle.
X. Smoothing and polishing bowl with sandpaper.

CONCURRENT RELATIONS OF SHOP AND ACADEMIC SUBJECTS—GRADE III

A. A. Cain
Instructor Ethical Culture School,
New York City

At the Ethical Culture School frequent conferences occur between class and shop teachers for the comparison of notes, exchange of ideas, and rearrangement of outlined plans of work, in order that shop projects and academic subjects may each be filled with the most vital interests of the other.

We endeavor to carry out this scheme of work from the kindergarten thru each of the grades. The following brief sketch of the work in several of the grades may illustrate the methods used.

In the kindergarten and primary grades, we strive to acquaint the children with a few simple tools and technicalities. As soon as they can hammer in a nail without its bending, and actually make a saw cut fairly straight, the class and shop teachers confer, after which there may be conferences with the children to discover the trend of interests. In the third grade, this year the children have decided to make additions to their furnishings in the way of flower boxes, folding stools, and a play house. The flower boxes have already been made in the shop. Their color scheme and decorations are being planned in the art periods. Other problems will develop in a similar way. The arithmetic of the grade is being applied to planning a zinc lining for the boxes. This requires application of the knowledge of addition for determining the length and width of the lining. (Also see fourth grade projects.)

Types of Fourth, Fifth, and Sixth Grade Work

INDIVIDUAL PROJECTS—GRADE IV

Charles Richards
Director of Manual Arts
Ethical Culture School, New York City

The Mechanic Arts Department, of the Ethical Culture School, is at present striving to get light on the problem of how best to gain in its shopwork those deep-seated, thoughtful, self-active interests, that the boys have shown in wireless work, aeroplane making, and all work which they have, themselves, adopted for the time being, as hobbies. It is well known that a hobby receives absorbing attention. What should we do to secure the same results in our regular shop work?

First came the suggestion that the pupils be allowed to choose their own individual projects regardless of any general class subject, rather than to have a common project chosen by the teacher. Then it was suggested that a subject like electricity or the boat-making industry be adopted and that, within the boundary of the subject, the pupil should have a free choice of a project.

For the past few years, the primary grades have had a very free choice of work. Last year in the fourth grade, we tried the second suggestion referred to above. The subject was the shipping industry. It was the bond that held the class in common. The boats resulting from this undertaking surprised us all. Every boy was anxious to build a boat according to his own idea. They

brought in ideas from models which they had seen in the parks and stores. They also delved into our shop library. Then in short talks we discussed, planned, and finally, in incredibly short time, produced boats of which the seventh or eighth grades could well be proud. Besides the boat, they gained spontaneously that vital subject-matter that tends toward an understanding and appreciation of progress in the world in which they live. The plan was pronounced a success by all, and is being repeated this year.

CLASS PROJECTS—GRADE IV

A. A. Cain
Ethical Culture School, New York City

In grade four, at the Ethical Culture School, New York City, we strive, so far as is possible, to begin the class project work. For the past two years it has been boat study and construction. The history studied in the grade centers about the Greeks, the Norsemen, the Vikings and the explorers of various centuries. This offers a splendid chance to create interest in getting information on the various types of boats used by the peoples that are being studied and on the evolution of design in boat building. Written articles on the information found also are asked for in connection with the English work of this grade.

FOOD PROJECT—DIFFERENCE BETWEEN FLOURS—GRADE V

Mrs. Lois Coffey-Mossman
Instructor of Elementary Education
Teachers College, New York City

During the war a fifth grade group of children took some time in discussing the problem of getting adequate food. The discussion led to the problem of getting flour to make bread. Several children said they did not like rye and barley bread. One boy announced that his mother had quit making bread because she could not buy wheat flour, and she could not make good bread from the flour she could get. Out of these and similar remarks grew a feeling that there is a difference between wheat flour and other kinds. The teacher told them that she had read that there was a difference which could be found by washing each flour in water and comparing the results.

Accordingly four bowls of water were procured and also four pieces of cheese cloth. In one piece, double thickness, was placed a quantity of about two tablespoonfuls of wheat flour; the edges of the cloth were drawn together and secured with a rubber band, so that there was formed a small, loose bag of flour. Similarly rye, barley, and corn flour were placed in cheese cloth. These were washed each in a separate bowl, by gently shaking back and forth in the water. Each of the four children undertook to care for one bag, washing it often during the day. The teacher washed a bag of wheat flour, at home, to be sure there would be some properly prepared.

The following morning the class met to examine the bags. Before opening them the children stated that they expected to find the following:

1. The wheat flour would be sticky because they had found it so in making flour and water paste.

2. The corn meal would be like wet sand. They could make no prophesy as to the barley and rye.

Then they proceeded to open the bags in this order: barley, rye, corn meal, and wheat. The rye and barley were slightly sticky, the water in each case being somewhat milky. The corn meal was like wet sand, not sticky. The wheat was a gray, sticky lump, and the water was very milky. The teacher then told them she had a bag of wheat flour she had washed at home, and opened it. The lump was more definite and stretched like rubber or chewing gum.

In response to the exclamations, "What is it?" it was developed that that was what was left after the starch was washed out into the water. The teacher supplied the name, gluten, telling them it is the protein of wheat.

Having found this difference, the class exchanged ideas until they agreed to the inferences that the gluten must do two things for the bread:

1. Keep it from crumbling by holding it together;

2. Hold in the gases developed in making the bread ready for baking, thus making the bread light.

To verify these inferences, they made two pans of corn bread, using the same recipe in each with the exception in the second instance of substituting, for half the corn meal, wheat flour. They baked the bread in a neighboring oven, the mixing having been done in the classroom.

On the basis of their inferences, they expected to find (1) the all-corn-meal bread thinner, because the gases had escaped and thus the batter was not lightened; (2) the all-corn-meal bread much more inclined to crumble.

When the bread was brought back to the room, the inferences were found to be correct, the bread containing wheat was twice as thick as the other and held together much more firmly.

ILLUSTRATIVE PROJECTS—GRADE V

Carrie B. Francis
Supervisor Industrial Arts
Indianapolis, Indiana

The 5A grade, at School Number 45, built a "Japanese Village," under the direction of Miss

Charlotte Thomas. This was based on their geography and correlated with art, spelling, composition, and arithmetic. The aim of this work was to give the children a means of expression that would develop their initiative and originality, and also acquaint them with the world around them thru their efforts to express their ideas and interests in concrete form.

From their homes and from the public library, these children brought books and pictures illustrating Japanese life and custom. They talked with people who had visited Japan, some of whom came to the school and told the class about Japan and its customs. The pupils decided the essential features of the village, which was to be staged on the sandtable. Various parts of the village were worked out as group problems. The children took the initiative in deciding what should be made, how it should be made, the proportions and the materials to be used. In several instances, different ways had to be tried before a successful one was worked out. Accuracy of representation, proportionate relation, color value, suitability of material, and artistic effects were some of the things for which the groups worked.

Entrances to the village were made attractive by the torii. The streets, which were ornamented with stone lanterns made of clay, were made lifelike by the jinrikisha and the tea and vegetable peddlers with baskets hanging from their shoulders. These were made of wood and painted in characteristic colors. An interesting part of the village, leading to the temple, was an arbor covered with wisteria. The figure of Buddha was modelled in clay by a boy who had never before done any successful handwork. He asked that he might do all the modeling. The bridge over the canal was a troublesome problem, as a proper curve for the bridge seemed impossible. One day a boy brought a coat hanger from home, because he thought it had a curve that would give the proper construction to the bridge. From this, they worked out the curve of the bridge. One prominent feature of the village was the tea house decorated with lanterns and oriental curtains, which were made from small kindergarten splints. To find a material for the roof, which was pliable enough to be shaped and would also suggest tile, required some experimenting. Corrugated paper, painted and shellacked to stiffen it, was found to be most successful.

The teachers felt that the work vitalized the academic subjects; that the child's freedom of expression, his self-direction, and his responsibility for his work helped to develop interest, originality, initiative, and independence in the class work.

RELATED PROJECTS—GRADE V

Gertrude A. Beers
Miami University, Oxford, Ohio

A fifth grade geography problem on the study of corn furnished a basis for a unit of work in food products manufactured from this cereal. In getting the material ready, each child made a booklet into which he pasted pictures from advertisements of every kind of corn product that could be found, such as cornstarch, oil, syrup, meal, breakfast-foods, etc. This booklet brought in the art problems of proper mounting of pictures and a cover design in which the corn plant was used as the motif.

It was next planned to make hominy. The class met out-of-doors to gather wood for a fire, which was to give the ashes for the lye. A cupful of sifted ashes to a quart of boiling water gave enough lye for the amount of corn used. The corn was boiled in the lye until the hulls loosened, then it was rubbed between cloths to take off the hulls. After being thoroly washed, the hulled corn was boiled until each grain was tender.

A party was now in order, so a committee was appointed to arrange the tables. The hominy was served with cream and sugar. Whittier's Corn Song, which had been memorized in the literature work, was recited at the beginning of the feast.

MAKING VASES OF CLAY—GRADE VI

Mrs. Lois Coffey-Mossman
Instructor of Elementary Education
Teachers College, New York City

It was a sixth grade class. A friend had brought in some flowers for the room—yellow nasturtiums. There was a nondescript collection of vases, red glass of inartistic shape, pottery of good design. There was one Chinese bowl, low and spreading, of the sort for pansies. In deciding which was the more suitable for the nasturtiums, there was not much difficulty in eliminating the red vase, or the low Chinese bowl. In the discussion of the various vases it became apparent that the children had little or no notion of what material the vases were made. Finally, some ventured that they thought the Chinese vase was made of clay.

This did not seem clear to many, so the teacher asked, "What is clay?" A number replied, "It's putty." Others thought it was wax and some suggested the word moldolith.

To clear their thinking, some native clay was brought into the classroom. The children were unconvinced that it was clay, asserting it was soft rock. Some was put into water and the effect noted. Similarly some *soft* clay was treated. Further, to bring out the notion, a piece of the

"rock" was rubbed between the fingers and the children saw it was really a powder. This brought out the teacher's knowledge of how the potter wedges his clay to make it more plastic by reducing the amount of air between the particles. The *Book of Knowledge* and encyclopedias were consulted, finding that clay was the result of "disintegration of feldspar." This needed explanation, so the story of the great glacial period was discussed.

Then one thoughtful child said he could not see how a bed of clay could be laid down free from rock and sand and gravel, since the glacier caused all this material to be mixed in the rushing waters flowing away. To answer, some clay, sand, pebbles, gravel, and rocks were put into a milk bottle with water. They were thoroly mixed into "muddy water." The children easily inferred that the rock and gravel would go to the bottom when the bottle had stood for a time. They were not sure what would "come down" next. In the morning distinct layers were to be seen below the clear water, the top layer being clay. The conclusion was drawn that a bed of clay is laid down only when water, muddy with clay, stands quiet for some time.

The bringing of clay into the room for answering these questions, together with the remarks made by the teacher about the plastic quality of clay as she had found it in making vases, furnished stimulus to lead some of the children to ask if they could try to make vases. The lack of zinc closets and the hot dry weather furnished much difficulty in handling the clay, which served to strengthen the notions of plasticity already brought out. Before the making had progressed far, the children began asking how the vase could be made so water would not soften it. This necessitated explanation of firing and the use of the kiln. The children wanted to know if they could fire their vases and glaze them. When green ware, biscuit ware, and glace ware were clear terms, the children saw that more than one firing was necessary, and then they thought out the fact that the first firing needed to be the hottest. Soon the question came: "How does the man know how to control the heat?" A "cone" was brought to the room and its use explained. A trip was made to the kiln to take the green ware to be fired.

When planning for the claze making, questions were numerous. "What makes the color?" "How do you put the design on?" The teacher had not felt it advisable to plan to mention underglaze decoration, but the question came and had to be answered. Then they wanted to know how the pattern is put on the sets of china so uniformly. This necessitated explaining the methods used in factories today. A trip was made to pottery shops to see the wheel method by kick wheel and by electric power wheel.

The third method of making vases—by the use of plaster-of-Paris molds—was taken up in the classroom, using a borrowed mold. It was unfortunate that time did not permit making a mold. The use of the plaster-of-Paris mold involved noting the utilization of the property of plaster-of-Paris in absorbing water but rejecting the clay contents of the water.

When the vases were nearly ready to go to the kiln—that is, after the children became interested in expressing their ideas of beauty by impressing the clay, shaping it to their liking, the teacher read to them Henry Van Dyke's "A Handful of Clay." A little of the history came incidentally, but time prevented getting a clear notion of the contributions and characteristics of the various nations in the field of pottery.

It may be of interest to note that these children, so full of questions about the facts of pottery making, seemed quite uninterested in hearing the myth of Grandmother Kaolin read to them.

CLOTHING—GRADE VI

Helen B. Gover
Supervisor Elementary Industrial Arts
Passaic, New Jersey

Two of the most surprisingly successful projects come in the fifth and sixth years at Passaic. The first is a work-apron for school use, for which the patterns are measured and cut by each pupil. The sewing is done by machine. The second is a study of dyes. Various articles such as table-runners, neckties, aprons, and collars are the means of using some kind of textile decorations. Stenciling, tied-and-dyed work, wood-block printing, and embroidery call for the mixing and use of simple dyes, and the dying seems to form an unending source of delight on the experimental side, some rather interesting results having been obtained. In both of these problems the boys are more interested than the girls. The detailed work and study included:

I. *Subject-matter:*

A. Linen:
   1. Industry in Europe and United States.
   2. Processes of manufacture.
   3. Advantages of linen over other materials.
   4. Ways of adulterating linen.

B. Summary of study of four fibers:
   1. Origin. 2. Uses. 3. Tests for presence in fabrics.

C. Dyes:
   1. Sources of dyes in ancient times.
   2. Vegetable dyes of colonial days.

3. Modern coal-tar dyes:
   a. Comparison in price and quality with earlier dyes.
   b. Problems of manufacture, German dyes, New American industry.
4. Ways of using in textiles:
   a. Dying cloth in the piece.
   b. Dying the yarn.
   c. Printing patterns.
   d. Earlier methods.

The important methods, which these teachers are stressing in approaching their so-called occupational studies, may be roughly classified as (1) *industrial*, (2) *neighborhood*, (3) *evolutionary*. Fig. III shows the number and per cent of teachers using each method of approach. The teachers who use (1), which is reported more frequently than both of the other methods (in approximately 54 per cent of the cases), believe that the pupils should understand the industries of today and become appreciative users of products and service. The teachers who use (2), which is reported by over 29 per cent of the cases, insist that it is wrong to have the industrial studies take the pupils beyond the first-hand experiences of the immediate neighborhood or locality. While the teachers who use (3), which represents over 16 per cent of those questioned, urge that the proper appreciation of our industrial development can be realized only by having the pupils evolve the study from the simple activities of primitive man to the complexities of the present time.

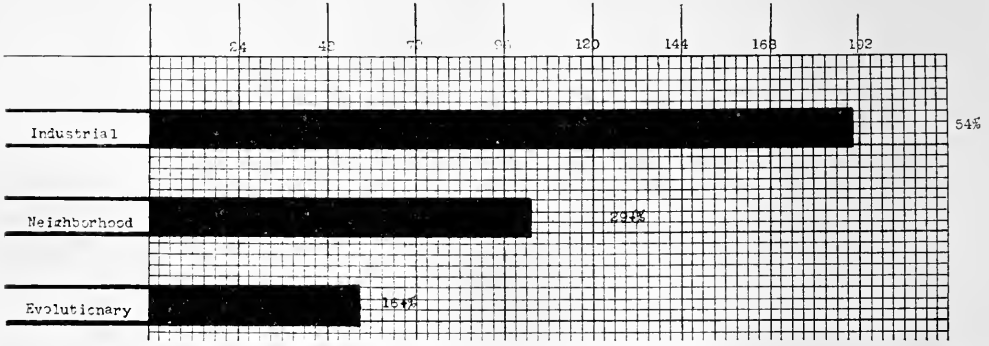

FIG. III. CHART SHOWING RELATIVE NUMBERS OF THESE 352 TEACHERS STRESSING EACH GENERAL METHOD OF APPROACH TO OCCUPATIONAL STUDIES.

D. Rubber clothing:
   1. Crude rubber industry.
   2. Goodyear and the development of the rubber industry

II. *Projects:*
   A. Flax processes.
   B. Testing cloth for various fibers by simpler methods.
   C. Aprons, runners, and ties, tied and dyed in colonial fashion.
   D. Chart of the rubber industry;
      Collection of rubber to show development from sap to finished product.

VARIABILITY IN METHODS OF APPROACHING AND OFFERING INDUSTRIAL STUDIES

Although the method of approach to these industrial arts studies varies somewhat in the different school systems, *the majority of the teachers are now making specific attempts to establish identity between the school experiences and the occupational activities in everyday life.* In fact, over one-half of the teachers definitely stated that these reproduced forms of occupational work make strong appeals to the spontaneous interests of their elementary grade children.

In spite of this marked difference in opinion as to the best approach for the study of industrial arts, *94.7 per cent of these teachers are committed to giving some time to a general understanding of the materials, processes, and problems involved in*

changing raw materials into more valuable commercial products. Nearly all of them also state, with varying degrees of emphasis, that *the industrial work might well be considered as a means for enriching or vitalizing several of the other school subjects.*

A wide range of opinion likewise exists as to the period above the third grade when the work of boys and girls should be differentiated. In the 141 school systems investigated the practices vary decidedly, especially in the fifth and sixth grades. Nevertheless, most teachers seem anxious to offer types of group and individual experiences which will respect all levels of general and semi-specialized abilities. Nearly 41 per cent of the schools reporting state that the industrial arts work is offered in common to girls and boys thruout the first six elementary grades, implying that they are alike in more ways than they are different, altho the individual differences and capacities are usually considered in the projects and problems developed. Over 29 per cent of these schools offer separate courses in the sixth grade, several claiming that the natural differences in the interests and aptitudes of boys and girls, even of this age, warrant this differentiation. Approximately 22 per cent of the schools begin differentiating their industrial arts courses in the fifth grade. However, only 7 per cent of these schools make any attempt to separate boys and girls for this work below the fifth grade.

Preparation for and Supervision of Elementary Industrial Arts Instruction

It is interesting to note that a large proportion—over 83 per cent—of the teachers represented by this investigation received no special training for giving instruction in industrial arts in their respective teacher-training institutions. On the other hand, it is encouraging that 127—or approximately 36 per cent of the total 352 teachers—report that they have since voluntarily improved their classroom work by becoming familiar with the recent developments in elementary industrial arts instruction thru summer courses, extension classes, and the like.

The amount and kind of supervision which exist in connection with the industrial arts activities also differ materially. *Over 88 per cent of these school systems report that the supervision is merely nominal, so far as improvement of classroom instruction is concerned.* Teachers report the greatest help and supervisors the best results where the specialists take the attitude of assisting the grade teachers, who naturally should have the better knowledge of their pupils' qualities. While it seems that several of the grade teachers are not sufficiently interested in the actual construction work to develop their own technic along with the pupils, a greater number of those who were not prepared reported that they have gradually taken over the responsibilities of giving the entire instruction, thus relieving the specialists for other duties.

General Summary

Finally, over two-thirds of the special teachers and supervisors of industrial arts questioned agree with the large number of classroom teachers that, in general, *the attendant skill and the related information acquired thru the elementary school period*—for pupils ranging from approximately 6 to 11 years, inclusive—*are to be justified mainly by resulting growth in thinking power and industrial intelligence.* In other words, they are, in the main, quite convinced that *situations, projects, and problems should provide the kinds and qualities of knowledge, thinking power, and skill (or dexterity) which will help pupils to establish those habits and attitudes that contribute most to their daily conduct as intelligent consumers and citizens.*